Title: When Life Serves You Lemons!

Brief Overview:

The students will be asked to create a lemonade stand to make money for the summer. Measurement skills will be used to help students build the stand (computationally) and produce the lemonade. Computation and estimation skills will be demonstrated by the students to make decisions, find costs, and find profits. Statistical analysis and decision making skills will be utilized to choose the best times and effectiveness of maintaining a lemonade stand.

Link to Standards:

- **Problem Solving** Students will use a variety of problem-solving methods to create a lemonade stand.
- **Communication** Students will respond to mathematical situations using oral, written, concrete, and graphical methods. They will work in groups to create a lemonade stand scenario computing the cost, profit, etc.
- **Reasoning** Students will demonstrate the ability to reason mathematically. They will make conjectures and gather evidence and build arguments to support the appropriate week to sell lemonade.
- **Number Relationships** Students will use numbers to decide the pricing of lemonade.
- **Computation** Students will select and use appropriate computational methods to calculate the cost and profit of running a business.
- **Statistics** Students will interpret and describe information obtained from the weather calendars so they can choose the highest level of success for the sale of lemonade.
- **Fractions** Students will be able to name fractions and find equivalent fractions.
- **Measurement** Students will be able to appropriately use and measure building materials and the ingredients for lemonade.

Grade/Level:

Grade 4-5

Duration/Length:

The activity should take 4-5 days.

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Estimating
- Basic algorithms
- Measurement
- Decimal fractions, using money and making change
- Reading tables
- Recognizing common proper/improper fractions, mixed numbers and the basic computation thereof

Objectives:

- Write a persuasive letter.
- Predict, organize, estimate, and interpret data using tables and graphs.
- Compute whole numbers and fractions.
- Work in groups to examine data and perform some calculations.
- Participate in real-life situation.
- Create a map of their neighborhood.
- Explain in writing the reasons for some decisions.
- Use calculators to perform some calculations.

Materials/Resources/Printed Materials:

- Crayons/Colored pencils
- Pencils and notebook paper
- Calculator
- Student Worksheets 1-6
- Teacher Resource Sheets 1-5
- Paper for ads and maps
- Rulers
- Something Queer At The Lemonade Stand by Elizabeth Levy
- Ingredients for lemonade

Development/Procedures:

Task 1:

- Read Something Queer At The Lemonade Stand aloud.
- Discuss and record reasons one might want to run a lemonade stand.
- Discuss items one would have to consider before beginning to sell lemonade and record on the board (or overhead).
- After grouping students, discuss the best time for selling lemonade.
- Pass out Teacher Resource Sheets 1-2 and Student Worksheet 1.
- Review averaging numbers and have them calculate the average temperature for each month, check together and then average each weekly temperature.
- Have students discuss the past data and predict the best week to sell their lemonade.
- Have them defend their predictions by writing a paragraph and sharing it with a partner.
- Discuss results of the predictions and then summarize.
- Prepare students for the planning of the location of their stand by discussing good locations for it.
- Have students create a map to show where they would place a lemonade stand in their neighborhood. This should be an accurate representation using symbols and pictures to give the reader a good mental picture.

Task 2:

- Have students locate advertisements and examine in their groups. Have them determine reasons for advertising and qualities of a good ad.
- Have students pretend that ads from the local paper sell for 8 cents/word. Given that information have them create an ad for the lowest price possible using the important information for their stand.
- Students may then write a paragraph defending their ad.
- Discuss advantages and disadvantages of using newspaper ads.
- Have students create an ad for their stand using another means and defend their reasoning to the class.

Task 3 (Use Student Worksheets 2-4):

- Review the concepts of adding, subtracting, and multiplying common, mixed, and improper fractions through a math game.
- The class will be shown a recipe. They will use think-pair-share to list possible ways to increase the yield of the recipe. The students will convert several recipes using the method decided upon by the class.
- Decide on the quantities they need for making lemonade and cookies based on previous discussions about the weather and neighborhood location.

Task 4:

- Calculate the cost of building a lemonade stand based on a given diagram and cost of materials (See Teacher Resource Sheet 3.) and discuss results.
- Review basic computations of multiplication and division in preparation for completion of several tables. (See Teacher Resource Sheet 4.)
- Have students decide on a price to charge for each cup of lemonade and explain their choice (Student Worksheet 5).
- Calculate the profit for a week given specific figures (Student Worksheet 6).
- Discuss profit versus cost to determine the feasibility of building and running a lemonade stand.
- Write a letter persuading their parents to allow them to build and operate a lemonade stand by listing reasons.
- Using what they've learned, have students write a letter persuading their parents to let them operate a lemonade stand. Write in the form of a writing prompt. (Rubric for grading letter is on Teacher Resource Sheet 5.)

Task 5:

Make lemonade and compute the actual cost for class.

Evaluation:

- Observation of group performance
- Teacher evaluation of completion of accurate maps and advertisements
- Written justifications of predictions and plans
- Accuracy of calculations of averaging, multiplying increased amount, cost and profit
- Rubric scored letter writing

Extension/Follow Up:

- Students can determine the feasibility of a lemonade stand and come up with other jobs to make money for the summer.
- Go through catalogs to find other items one might want to save money to buy and predict how long it might take based on the lemonade stand.
- Plan and build an actual lemonade stand for the school fair or field day as a fund raiser.

Authors:

Janelle Cropper
Fruitland Intermediate School
Wicomico County, MD

Anita Harrington
Fruitland Intermediate School
Wicomico County, MD

Debbie Gray
Fruitland Intermediate School
Wicomico County, MD

Teacher Resource Sheet 1		July			1996	
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
☺ - SUNNY ✺ - CLOUDY ☹ - RAIN	**1** ☺ 87º	**2** ☺ 89º	**3** ☺ 93º	**5** ✺ 91º	**6** ☺ 98º	**7** ☺ 95º
7 ☹ 75º	**8** ☺ 84º	**9** ☺ 81º	**10** ☹ 77º	**11** ✺ 79º	**12** ☺ 93º	**13** ☺ 101º
14 ✺ 88º	**15** ☺ 79º	**16** ✺ 83º	**17** ☺ 88º	**18** ☺ 94º	**19** ☺ 88º	**20** ✺ 79º
21 ☺ 88º	**22** ☹ 88º	**23** ☺ 94º	**24** ☹ 88º	**25** ☹ 95º	**26** ☺ 102º	**27** ☺ 106º
28 ✺ 88º	**29** ☹ 88º	**30** ☺ 88º	**31** ☺ 88º			

Teacher Resource Sheet 2		August			1996	
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
☺ - SUNNY ✺ - CLOUDY ☹ - RAIN				1 ☺ 96°	2 ☺ 99°	3 ☺ 103°
4 ☺ 95°	5 ✺ 90°	6 ✺ 86°	7 ☹ 84°	8 ☹ 78°	9 ✺ 85°	10 ✺ 83°
11 ✺ 88°	12 ☺ 90°	13 ✺ 94°	14 ☺ 100°	15 ☺ 99°	16 ☺ 101°	17 ☹ 85°
18 ☹ 80°	19 ☺ 94°	20 ☺ 90°	21 ☺ 84°	22 ☺ 88°	23 ☹ 85°	24 ✺ 97°
25 ✺ 87°	26 ✺ 90°	27 ☺ 104°	28 ☺ 100°	29 ☺ 99°	30 ✺ 92°	31 ✺ 95°

Student Worksheet 1

Name:_____ Date:_____

Directions: Using the previous calendars, calculate the average temperature for each week.

1. July 1-6 _____
2. July 7-13 _____
3. July 14-20 _____
4. July 21-27 _____
5. July 28-August 3 _____
6. August 4-10 _____
7. August 11-17 _____
8. August 18-24 _____
9. August 25-31 _____

Now that you have averaged each week, find the average for each month.

July_____ August_____

Which month would be the best to sell lemonade?

When would you plan to have your lemonade stand? Why?

What other things could you do to (or use) to predict the best time to have your stand?

Which method would be the best to most accurately predict the best time to sell lemonade?

Student Worksheet 2

Name:_____ Date:_____

COOKIES NEEDED IN ORDER TO FEED ENTIRE CLASS

Directions: Below are the ingredients for making chocolate chip cookies. Since this recipe only makes 30 cookies we will need 60 cookies for our class. Calculate how much you will need if you double this recipe.

Chocolate chip cookies

Yields= 30 cookies

½ cup margarine
½ cup sugar
½ cup brown sugar
½ teaspoon of vanilla
1 egg
11/4 cups of flour
½ teaspoon of salt
½ teaspoon of soda
6 ounces of chocolate chips

Use the following table to help you convert this recipe from 30 cookies to the amount needed so that each student will be given 2 cookies each.

Number of students in class: _____ Recipes needed:_____

Ingredient:	Amount needed for one recipe:	x	Recipes needed =	Totals
_____:	_____	x	_____	= _____
_____:	_____	x	_____	= _____
_____:	_____	x	_____	= _____
_____:	_____	x	_____	= _____
_____:	_____	x	_____	= _____
_____:	_____	x	_____	= _____
_____:	_____	x	_____	= _____

Student Worksheet 3

Name:_____ Date:_____

LEMONADE TO QUENCH OUR THIRST

Directions: Below are the ingredients for making one quart of lemonade. We will need four quarts to serve the whole class. Expand this recipe using the same type of calculations as you used for the cookies.

Lemonade Yields=1 quart

3 lemons
1/4 pound of sugar
Grated lemon rind of ½ lemon

Use the following table to help you convert this recipe from one quart to the amount needed for your class.

Number of students:_____ Recipes needed:_____

Ingredient:	Amount needed for 1 recipe:	X	Recipes needed:	= Total
_____:	_____:	X	_____:	= _____
_____:	_____:	X	_____:	= _____
_____:	_____:	X	_____:	= _____

Student Worksheet 4

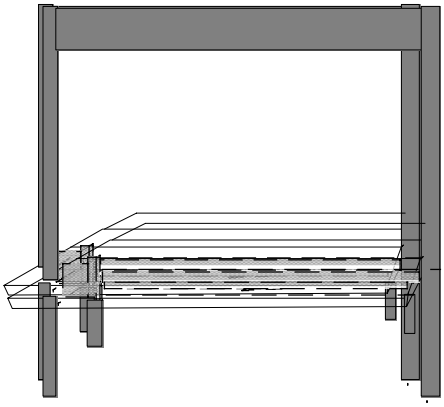
Name:_____ Date:_____

PREPARING TO FEED THE MASSES

Directions: Based on the data collected during our think-pair-share activities predict the amount of cookies and lemonade you will need for one week. Remember to consider factors such as the weather, day of the week, and location. Using the following table make your predictions about the amounts needed for our lemonade stand.

Factors	Recipes needed
1. Sunny weather forecasted=	_____
2. Rainy weather forecasted=	_____
3. Holiday, neighborhood yard sale, etc.=	_____
4. No special events taking place=	_____

Place a tally at the end of each factor which might hold true for any given week. Total the tallies. The total should equal the number of recipes needed for that week. This will given you an estimate for the recipes needed.



Teacher Resource Sheet 3

All boards measure 8 feet.
The back legs measure 3 feet.
Under the table part are 3 foot sides and an 8 foot brace.
Nails cost $ 1.99 a box.
Calculate how much this stand would cost to build.

Teacher Resource Sheet 4

Review of multiplication and division to fill in the table.

Copy this table on the board or overhead. Read aloud the directions. Discuss the procedure for finding the price per cookie.

Directions: Several recipes for chocolate chip cookies were found and the cost to make each batch totaled. Decide which recipe would be the cheapest to make.

Recipe	Cost	# of cookies made	Price per cookie
1	$ 2.50	36	_____
2	$ 3.20	40	_____
3	$ 1.75	28	_____

Which recipe would be the cheapest to use?_____

Assuming two for twenty-five cents is charged calculate the amount of the sale or the number of cookies sold in the chart below.

Number of cookies	Amount of Sale
12	_____
_____	$3.00
16	_____
_____	$7.00

If twenty-five cents is charged for every two cookies will a profit be made? Explain your answer.

Student Worksheet 5

Name:_____ Date:_____

MAKE LEMONADE

Directions: Using the lemonade recipe from Worksheet 3 estimate the cost of 1 quart of lemonade given the following prices. You will need to find the price of each cup and complete how many cups will be in 1 quart.

Price
Lemons 6- $1.00
Sugar 5Lb.--$l.48
8oz. cups-- $2.19 for 18

Decide on a reasonable price to charge per cup._____Write an explanation of how you chose that amount.

_____
_____
_____
_____
_____

Using your price from above, fill in the amount of money made and the profit earned on the table.

Day	# of Cups Sold	Amount of Sale	Profit
Monday	5		
Tuesday	7		
Wednesday	4		
Thursday	10		
Friday	24		
Saturday	32		
Sunday	12		

Student Worksheet 6

Name:_____ Date:_____

Profitable? Yes/NO

Directions: Use the chart below to calculate the profit from your lemonade stand for the summer.

Cost of Stand:	$26.00
Cost of Advertizing:	$ 5.00
Cost of Ingredients:	$60.00
Total Cost:	$91.00
Money Collected:	$200.00

Now calculate your profit for the summer._____

Was it profitable to sell lemonade for the summer? Write a letter persuading your parents to let you operate a lemonade stand. Explain and support at least three reasons why you want to do this.

Name:_____ Date:_____

SCORING RUBRIC FOR PERSUASIVE LETTER

3 Points
- 3 reasons
- very convincing
- complete sentences (may contain few errors)
- addresses topic

2 Points
- 2 reasons
- convincing
- complete sentences (may contain errors)
- addresses topic

1 Point
- 1 reason
- somewhat convincing
- complete sentences (may contain many errors)
- somewhat addresses topic

0 Points
- 0 reasons
- not convincing
- may not be written in complete sentences
- does not address topic